REMARKS/ARGUMENTS

This is a response to the Office Action of August 19, 2005, in which a three-month term was set for response. Accordingly, the Applicant includes a request for a one-month extension of time.

Amendments to the Specification

The Applicant has amended the seventh line of the paragraph on page 1, starting at line 24 to replace the word "manufactures" with the word "manufacturers".

The Applicant has amended the first line of the paragraph on page 6, starting at line 12 to correct a typographical error, and has added the word "a" before the word "plurality".

The Applicant has amended the seventh line of the paragraph on page 15, starting at line 28 by adding a period after VUR2.

The Applicant has amended the second line of the paragraphs on page 16, starting at line 28 and on page 17, starting at line 7, to replace the word "invertors" with the word "inverters".

The Applicant has also amended the fourth line of the paragraph on page 17, starting at line 7, to replace the words "can not" with the word "cannot".

The Applicant has amended the second line of the paragraph on page 18, starting at line 7, to correct inadvertent errors in the reference numerals that are used for the nine D flip-flops.

The Applicant has amended the second line of the paragraph on page 18, starting at line 15 to correct an inadvertent error in the reference numeral that is used for the reduced clock signal.

The Applicant has amended the third and fourth lines of the paragraph on page 20, starting at line 1, to add a comma after S3 and to pluralize the word "sub-circuit".

The Applicant has amended the seventh line of the paragraph on page 24, starting at line 8, to change the word "or" to the word "for".

The Applicant has amended the fourth line of the paragraph on page 26, starting at line 5, to add the word "and" before "the transistor QA".

The Applicant has amended the seventh line of the paragraph on page 32, starting at line 4, to change a comma to a period.

The Applicant has amended the second line of the paragraph on page 33, starting at line 4, to change the term "VLSI" to "VLSI".

Amendments to the Abstract

The Applicant has amended the second line of the abstract to replace the word "Circutis" with the word "Circuits".

Amendments to the Claims

In this response, claims 34, 46 and 50 have been amended. By this response, there are still 19 claims pending for this application.

Claim 34 has been amended to better recite the invention. Claim 34 now recites a test circuit for testing an integrated circuit on a wafer. The test circuit is formed on the wafer

with the integrated circuit. Claim 34 further recites that the test circuit comprises a variable ring oscillator circuit including: a base ring oscillator circuit; a plurality of sub-circuits selectively coupled to the base ring oscillator circuit; and, a plurality of switching elements for selectively coupling at least one of the plurality of sub-circuits to the base ring oscillator circuit. Claim 34 also recites a control circuit to enable at least one of the plurality of switching elements to selectively couple at least one of the sub-circuits to the base ring oscillator circuit to produce different versions of the variable ring oscillator circuit. Claim 34 also recites that the test circuit conducts a separate test of the integrated circuit for at least one of the versions of the variable ring oscillator circuit. Support for the amendments made to claim 34 are on pages 19 to 24 of the application as filed.

Claims 46 and 50 have been amended to correct inadvertent errors. Claims 46 and 50 previously referred to an "apparatus". Claims 46 and 50 have now been amended to refer to a "test circuit". Further, claim 50 has been amended to recite a "second" ring oscillator in the second and third lines of the claim to distinguish from the variable ring oscillator recited in claim 34.

Claim Rejections – Double Patenting

In paragraphs 2-3 of the Office Action, the Examiner rejected claims 34-47, and 50 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-19 of U.S. Patent No. 6,759,863 (Moore). The Examiner argued that although the conflicting claims are not identical, they are not patentably distinct from each other because they are still in the same scope of the invention.

However, the Examiner advised that a terminal disclaimer in compliance with 37 CFR 1.321(c) can be used to overcome a rejection based on a non-statutory double patenting ground provided the conflicting patent is shown to be commonly owned with this application.

In response, the Applicant submits herewith a terminal disclaimer in compliance with 37 CFR 1.321(c) along with the fee of $65.00 (Applicant is a small entity) as prescribed in 37 CFR 1.20(d) to overcome the obviousness-type double patenting rejection. The Applicant further submits that the patent US 6,759,863 is commonly owned along with the subject application by The Governors of the University of Alberta. An assignment for the subject application was filed on November 18, 2005.

Claim Rejections—35 U.S.C. §102

In paragraph 6 of the Office Action, the Examiner rejected claims 34-47, 50, and 54-57 under 35 U.S.C. 102(b) as being anticipated by Merrill et al. (US 5,039,602) hereafter referred to as Merrill. In particular, for claim 34, the Examiner argued that Merrill discloses (see Fig. 2) a test circuit (22) for testing an integrated circuit (86) on a wafer (84), the test circuit is formed on the wafer with the integrated circuit, and the test circuit comprises: a) a base ring oscillator circuit (30), b) a plurality of sub-circuits (32, 34) coupled to the base ring oscillator circuit (30) and, c) a control circuit (32) to selectively couple the sub-circuits (34) to the base ring oscillator circuit (30) to produce different versions of a variable ring oscillator (30) circuit associated with a selected sub-circuit. The Examiner further argued that the test circuit (22) conducts a separate test of the integrated circuit (86) for at least one of the versions of the variable ring oscillator circuit (30).

In response, the Applicant submits that amended claim 34 now recites a test circuit that comprises a variable ring oscillator circuit. The variable ring oscillator circuit includes a base ring oscillator circuit, a plurality of sub-circuits selectively coupled to the base ring oscillator circuit, and a plurality of switching elements for selectively coupling at least one of the plurality of sub-circuits to the base ring oscillator circuit. Claim 34 further recites that the test circuit includes a control circuit to enable at least one of the plurality of switching elements to selectively couple at least one of the plurality of sub-circuits to

the base ring oscillator circuit to produce different versions of the variable ring oscillator circuit. Claim 34 also recites that the test circuit conducts a separate test of the integrated circuit for at least one of the versions of the variable ring oscillator circuit.

The Applicant respectfully submits that Merrill does not teach a plurality of switching elements for selectively coupling at least one of a plurality of sub-circuits to a base ring oscillator circuit. Merrill simply teaches a circuit including a ring oscillator (30), a frequency divider (32) and a frequency to voltage (F/V) converter (34). The ring oscillator (30) is directly and always connected to the frequency divider (32). The frequency divider (32) is directly and always connected to the F/V converter (34). Merrill does not teach the use of switching elements to change the configuration of the ring oscillator (30) or even the circuit (22) for that matter. This is clearly different than the Applicant's claimed invention.

Furthermore, the Applicant respectfully submits that there are several flaws in the Examiner's arguments for the rejection of claim 34. The Examiner argued that the frequency divider (32) and the F/V converter (34) are sub-circuits and that the frequency divider (32) acts as a control circuit (32) to selectively couple the sub-circuits to the base ring oscillator circuit (30) to provide different versions of a variable ring oscillator (30) circuit associated with a selected sub-circuit.

Firstly, the Applicant submits that the frequency divider (32) cannot be considered to be both a sub-circuit as well as a control circuit to selectively couple sub-circuits to the base ring oscillator (30). Secondly, the Applicant submits that the frequency divider (32) cannot act as a control circuit to selectively couple a sub-circuit to the base ring oscillator circuit since there are no switching elements in Merrill's circuit that can be used to selectively couple a sub-circuit to the ring oscillator (30) (i.e. the circuits (30), (32) and (34) are hardwired together). Merrill only teaches one configuration for the test circuit.

Also, the Applicant submits that the frequency divider (32) does not provide a control signal for selectively coupling a sub-circuit but rather always provides a reduced version of the clock signal that is produced by the ring oscillator (30). It can be argued that a typical control signal would have varying states and not simply be a clock signal that varies periodically between low and high signal states. Further, the Applicant submits that it is clear that Merrill teaches the use of the frequency divider (32) for only obtaining a lower frequency signal to be used as a suitable clock signal for the F/V converter (34).

Accordingly, the Applicant respectfully submits that claim 34 is novel and inventive over the cited reference and should be allowed. Further, since claims 35-47, 50 and 54-57 depend either directly or indirectly from claim 34, as well as introduce other patentable features, the Applicant respectfully submits that claims 35-47, 50 and 54-57 should also be allowed.

Claim Rejections—35 U.S.C. §103

In paragraph 8 of the Office Action, the Examiner rejected claims 39, 42, 43 under 35 U.S.C. 103(a) as being unpatentable over Merrill in view of Lee (US 5,686,855). In particular, with regards to claim 39, the Examiner argued that Merrill discloses (see Fig. 2) everything except for the sub-circuit that comprises a delay element to change the frequency of oscillation of the variable ring oscillator circuit. The Examiner further argued that Lee teaches a sub-circuit comprising a delay element (24, 28) to change the frequency of oscillation of the variable ring oscillator circuit.

In response, it is respectfully submitted that a person of ordinary skill in the art would not combine the Merrill and Lee references since these references teach different techniques of assessing the performance of an integrated circuit. For instance, Merrill teaches a ring oscillator whose frequency is a function of the AC and DC parameters of the integrated circuit. Merrill further teaches the use of a frequency divider to reduce the frequency and a frequency to voltage converter to convert the frequency to a voltage.

Accordingly, by measuring voltage with Merrill's circuit, one can obtain a measure of the frequency of the ring oscillator. On the other hand, Lee teaches the use of two delay units that are connected somewhat in parallel. Lee further teaches using the phase differences between the rising and falling edges of the pulses at the outputs of the first and second delay units to determine the performance of an integrated circuit. Accordingly, it is quite clear that Merrill and Lee teach circuits and methods that are independent of one another and hence not readily combinable.

Furthermore, the Applicant respectfully submits that even if one were to combine the Merrill and Lee references, a skilled person in the art would not arrive at the Applicant's claimed invention. The Applicant submits that it is quite clear that Merrill and Lee do not teach a plurality of sub-circuits, a plurality of switching elements or a control circuit that can selectively couple at least one of the plurality of sub-circuits via at least one of the switching elements to a base ring oscillator circuit to produce different versions of a variable ring oscillator circuit.

Accordingly, the Applicant respectfully submits that claim 39, 42 and 43 are novel and inventive over the cited references and should be allowed.

CONCLUSION

In view of the foregoing comments, it is respectfully submitted that the application is now in condition for allowance. If the Examiner has any concerns regarding this response, the Examiner is respectfully requested to contact the undersigned at 416-957-1603.

Respectfully submitted,

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